2023 Year 12 Methods Unit 3&4

Semester One Exam – Calculator Assumed Marker's Report.

Question 8

(a)   Students answered this question quite well. The key word here is uniform which means each outcome is equally likely to occur.

(b)   No issues

(c)   Students who wrote Bernoulli were given full marks. Some students who wrote Bernoulli for one trial and Binomial for n trials were given full marks. The lack of any mention of n means we cannot really classify this as a binomial distribution.

(d)   This question was done quite poorly by students. My assumption is that the question was not read properly or not tied back to the original statement at the top of the question.

(e)   Students mostly gained follow through marks for their incorrect probability from part (d) but most understood it was a binomial distribution question.

Question 9.

(a)   This question was attempted by most students and done well for those who attempted it. I believe this can be done straight from the e-activity so students familiar with this tool were about to get 3 marks with little to no effort. A common error was to not square the 6.72 to achieve the variance to use in the np(1-p) formula.

(b)   This was a change of origin/scale question. Those who understood were able to achieve the 2 marks quite easily. Students need to more aware that these types of questions continue to pop up when working with DRVs.

Question 10.

(a)   This question was done quite poorly by many candidates. Perhaps the understanding of half life needs to be re-looked at by these students. It was a matter of setting up the equation and solving for k.

(b)   Was pleasing to see that most students were not fooled by the question asking for 10 days rather than 10 hours. Follow through marks were given throughout this question.

(c)   No issues here. FT awarded for incorrect k values.

(d)   This question showed a lack of understanding by most students regarding the link between the derivative and exponential function. i.e $\frac{dM}{dt} = -kM$. Students did this question the long way and solved for the derivative by first calculating the derivative. Not wrong just not showing a true understanding of the concept.

Question 11.

(a)   Radians Radians Radians. This type of error continues to rear its ugly head and needs to be addressed. If you are using your calculator please check that it is in radians before working a question like this.

I was baffled that many students were not able to solve this question. Errors occurred because of the radians issue as well as solving equal to zero rather than the 0.22 which is where the Inselberg hits the plain.

(b)   FT marks were awarded. A lot of typing on my CP to check peoples incorrect a and b values from part (a).

Most students again forgot to subtract the rectangle from a to be with a height of 0.22. This could have been done by using the area of the rectangle or by including the 0.22 in the integral.

(c)   (i)   Again- Radians to solve caused issues here. Another issue was students did not scroll across on their CP to get the 3rd solution for stationary point. The question must be asked why? If I look at that function I can see three stationary points therefore I know I should get 3 solutions. The most common error is that students again did not subtract the 0.22km to determine the true height of the Inselberg.

(ii)   Many students lost marks here because they did not structure their answer correctly. It is not valid to say -3.95 therefore maximum. You need to elaborate that when the second derivative is less than zero then we have a max. It is not up to the marker to know this or understand this.

A final comment on this question is that is says right at the top that calculus must be used which means using derivatives and second derivatives in all solutions. Granted it is in the Calc assumed a few students used the CP rather than calculus which meant that marks could not be awarded. Be Careful- read the question.

Question 12.

This was the most poorly attempted question in the Calc Assumed section.

(a)   A large percentage of students were unable to calculate the basic probabilities in this question. The first thing I did when working this question was to create a two-way table to determine the probabilities. This took all of 30 seconds. Follow through marks were awarded for incorrect probabilities used in the Binomial distribution.

The next error made by many students is they did not use a binomial distribution. Some used a hybrid version of it which did not include the "Choose" parameters at the front which meant it was incorrect. Remember when you are doing an exam try to think about what will be examined. Many were teleported back to year 11 methods and tried to answer the question in that mindspace.

Finally, remember when a new distribution is created it MUST be defined. This was the case in each part ii and iii of (a).

(b)   This was done a little better than part (a) however students were again confusing variance and standard deviation. This can be calculated on the CP using the e-activity.

Question 13.

On the whole this question was completed quite solidly by most students which was pleasing to see. The CP use appeared to be quite solid which was good to see. This type of question can be completed entirely on the CP in 4-5 minutes.

(a)   The main issue here was the calculation of c. Remember to never assume substituting in 0 will result in all 0 terms. This is a common error and continues to happen. The best way to eliminate this is to literally write the substitution out. You will soon see that the exponential term evaluates to -10.

(b)   A very common error here involved the misreading of units. The equation was in terms of cm whilst the initial displacement was 2 m = 200 cm. Again, reading the question a second time over can alleviate this.

(c)   Done well by most students. No real issues here. FT was awarded.

Question 14.

This question was completed extremely poorly and in my opinion was very gettable marks which many students did not take. The majority of students made the simple error of reading the integral as representing the area. Please remember that the integral is not the area and thus anything below the x-axis will have a negative affect on the value.

The transformations in this question were kept fairly simple. In class we practiced changes in inputs whereas the question kept it simple in (b) with a vertical shift and a vertical stretch in (c).

Part (d) was not too tricky if students familiarised themselves with FTOC and understood that the integral of the derivative essentially takes us back to the function at that value. Nothing too tricky here.

Pretty disappointing and this is something that almost all students need to revisit before Semester Two exams.

Question 15.

I was quite pleased with this question and it was done quite well throughout the cohort.

(a)   Remember that even though this is the Calc Assumed section the examiner can still get you to perform calculus by asking you to SHOW. Always look at the mark distribution and use this as a guide to how many steps you should show in your working- if in doubt go over the top.

(b)   This was a big improvement from the test question on this type of question using FTOC. It was pleasing to see that most students had made sure they understood the processes required and re-learnt this for the exam. There are however still some students who did not right the wrongs from the test which is unacceptable at this level.

(c)   No real issues here for those who attempted it and used their CP.

(d)   FT marks were awarded here.

Question 16.

Probability again caused major issues in this game theory type question. It baffles me how many students did not draw a two-way table to determine the probabilities required to calculate the question. It really makes things easy to see and to work with because you are looking at the outcomes.

(a)   Was not the nicest of questions. Most people were drawn to answer why was it a DRV which is not actually what it's asking. Forgivable.

(b)   Horrible to mark because most candidates simply did not have the correct outcomes and/or probabilities. Remember in these game questions that the outcomes need to take into account the cost of the game or money in vs money out. Be careful.

(c)   I used the e-activity on my CP to calculate part (b) – although working is required and should be shown, and part (c) in under 30 seconds. Did you use the technology available to you or did you waste time using formulas?

(d)   Another change of origin and scale. Some students used the long calculation to solve for x in a new $E(X) = 0$ equation. Not required if you get your head around change of origin and scale.

Question 17.

This was the A+ question of the exam however most students should have and did get full marks for part (a). You have a CP you can draw the graphs and copy them onto your paper. Most students were also comfortable using the CP to calculate the value of the area R which was good to see.

(b)   For this question you really needed a strong understanding of what was happening with the graphs. Well done to the couple of students who got full marks for this question.

Question 18.

This question was a little left of field than what is usually served up for this curriculum dot point and this threw some of the candidates off.

(a)   Not answered very well. This is assumed knowledge from year 11.

(b)   As above.

(c)   The table was completed well but most students did not explain that these were the approximations for the derivative of 4^x.

(d)   Many students wrote 2.718 which unfortunately is not e. This question is straight from one of the SCSA curriculum dot points. Remember these dot points are the most important tool when you are learning. Treat them with more respect.

Question 19.

This question was not attempted very well by most students. Perhaps it was a lack of time left to complete it or the understanding was simply not there. I am aware that this type of question has been used in previous assessments which lends itself to the idea of working as many past papers as possible.

(a)   Again, students need to be very careful here in the way that they justify. You must mention that the second derivative was greater than zero thus you have a minimum. You cannot just say it equals 2 therefore minimum.

(b)   Of those who attempted it only some were able to realise that the product rule must be in use to evaluate the question.

(c)   Same as part (b) only a handful of students were able to employ the use of both the chain rule for the numerator and product rule for the overall function.

Overall Average (Calculator Assumed) – 56.82%

Positives:

- Classpad use for general calculus was pretty solid
- Rectilinear motion
- Exponential functions

Negatives

- FTOC and Integral linearity i.e. Q14
- Probability/DRVs
- Can we use CP for more questions- DRVs etc. E-activity use was marginal.

<u>Now what?</u>

Now it is time for you to perform your exam autopsy- where did you go well, where didn't you go well? Which 3 topics were your weakest and need to be looked at for the mock and ATAR exam? Could you have done the questions in a different order to maximise your potential marks?

Write a detailed report similar to this one and use it when you begin your preparation for the next set of exams.

We go again in Semester Two - 9 weeks of school away.